

EPA Superfund Site Update

Army Creek/Delaware Sand & Gravel Landfills



Focus on Public Water Supply
October 2001

U.S. Environmental Protection Agency, 1650 Arch Street, Philadelphia, PA 19103

www.epa.gov/region3

Highlights

- **Public water free of BCEE**
- **Groundwater sampling shows spread of contamination is limited**
- **Upcoming groundwater flow model to provide more clues**
- **Air monitoring shows air is O.K.**
- **Swimming in Army Creek also O.K.**

Background

The U.S. Environmental Protection Agency would like to share with the community the most recent developments that relate to the Army Creek and Delaware Sand and Gravel Superfund sites.

Since 1973, New Castle County has operated groundwater recovery wells near the Army Creek and Delaware Sand & Gravel sites. These wells are intended to create a "groundwater divide" by drawing water away from the Artesian Water Company's Llangollen well field in order to keep site contamination from entering the public water supply. (See center-fold map.)

In October 2000, BCEE, a chemical used in the manufacture of pesticides, was found in the Llangollen water supply near the two Superfund sites. Since then, much work has been done by county, state, federal and Artesian officials to ensure that the residents of northern New Castle County are receiving and will continue to receive public water that meets drinking water standards. And, work has begun on getting the big picture of groundwater quality in the area to prevent future contamination of the water supply.

What's Been Done So Far

Upon discovering low levels of BCEE in the public water supply, Artesian immediately took steps to protect the water supply, by shutting down the affected supply wells and installing carbon filters to remove the BCEE. **Since the installation of the filters, the public water supply continues to be free of BCEE.**

New Castle County took an additional measure to address the contamination closer to its possible sources. The county, which is handling the cleanup of the Army Creek site, doubled the pumping rate in its recovery wells near the Superfund sites. It is anticipated that the increase in the pumping rate will more effectively maintain the groundwater divide between the public water supply and the two sites, until the best long-term solution can be arrived at based on new studies underway.

In addition to the two Superfund sites, there are two other potential sources of contamination – the Denton Landfill and the former Amoco Polymer plant, both areas which are being investigated by the Delaware Department of Natural Resources and Environmental Control.

BCEE Information

BCEE stands for bis(2-chloroethyl)ether which is currently used in the manufacture of pesticides. Sometimes, BCEE is used as a solvent for fats, waxes and greases. EPA classifies BCEE as a probable human carcinogen, meaning that ongoing, routine exposure to BCEE over many years may contribute to the development of cancer. Lab studies show that BCEE causes liver cancer in mice. No human studies are available.

Groundwater Sampling Shows Limited Spread of Contaminants

New Castle County has done a comprehensive groundwater survey of the area to sample for a wide range of contaminants and attempt to trace the source of the BCEE. (See table on page four.) The county collected samples from 14 monitoring wells, eight recovery wells and two public water supply wells. The county analyzed the samples for a laundry list of contaminants called EPA's Priority Pollutants. It includes volatile organic compounds, semi-volatile organic compounds, pesticides, polychlorinated biphenyls (PCBs) and metals – 151 in all. Here's what they found in the treated water, the supply wells, the recovery wells and the monitoring wells.

Treated Water – The good news is that Artesian Water Company's treated water supply – the water that is distributed to the community – meets all drinking water standards.

Supply Wells – And, the company's raw water supply wells (pretreatment) are almost free of all contaminants, with a few exceptions. The county did find trace amounts of six chemicals in two raw water supply wells. Keep in mind that water from these raw water supply wells is treated to remove contaminants before they reach people's homes.

Recovery/Monitoring Wells – As expected, several contaminants were found in recovery and monitoring wells near the Superfund sites at levels which exceed standards. The results show that the highest concentrations of BCEE are present in groundwater beneath and downgradient of the Delaware Sand & Gravel Landfill site. Water from the monitoring wells is for testing only, and water from the recovery wells is pumped to the Army Creek groundwater treatment plant where contaminants are removed. Keep in mind that water from these wells is not used as a public water supply.

In addition to the BCEE, several metals, volatile organic compounds and semi-volatile organic

compounds were found to exceed standards in the monitoring and recovery wells. To address these contaminants, a number of cleanup measures are being undertaken at the Army Creek and the Delaware Sand and Gravel Landfills.

Superfund Site Summaries

Army Creek Landfill

Located on 60 acres two miles southwest of the city of New Castle, it is an abandoned sand and gravel quarry that was operated by New Castle County from 1960 to 1968 for disposing municipal and industrial waste. In 1972, groundwater contamination was found in a residential well located adjacent to the Llangollen Estates housing development. Later, sampling of the underground aquifer identified a plume of contamination – chemicals migrating from the landfill. Artesian Water Company uses a well field for public drinking water supply one-half mile downgradient from the site. It serves about 5,000 customers.

In December 1993, a multi-layer cap was put over the landfill to prevent water from leaching more contaminants into the groundwater. An on-site groundwater treatment system, which pumps out contaminated groundwater and treats it, was completed in 1994. The system will operate until the cleanup standards in the aquifer are met.

Delaware Sand and Gravel Landfill

Located on 27 acres two miles southwest of the city of New Castle and adjacent to the Army Creek Landfill, it is also an abandoned sand and gravel quarry that was used for industrial waste disposal. This facility was privately operated. Thousands of drums of liquids and sludges from chemical, manufacturing and petroleum refining were dumped there. Contamination from this site has also entered the groundwater.

Major cleanup work has been done at this site, including the off-site disposal of 13,000 drums and 2,300 cubic yards of contaminated soil. A slurry wall was built around the quarry to contain waste and the contaminated water is being removed from this containment area. Additionally, a bioventing system is in place to blow air into contaminated soil to help bacteria break down the hazardous substances in the soil. Certain areas of the site were capped and gas-venting systems were installed along with those caps. Some areas were excavated, backfilled with clean soil and revegetated.

Groundwater Flow Model to Provide Clues

The EPA has approved a New Castle County plan to develop a groundwater flow model and conduct a groundwater pumping optimization study. **The goal of these studies, which are scheduled to be completed in spring 2002, is to arrive at the best strategy to protect Artesian Water Company's water supply from area contaminants.**

In order to accomplish this goal, the county will install eight additional groundwater monitoring wells and continue to expand the current groundwater monitoring program. These additional measures will help identify the sources of BCEE and provide additional information about groundwater quality at the Delaware Sand and Gravel Superfund site, the western end of the Army Creek Superfund site, and the Denton Landfill.

Air Monitoring Results Are O.K.

In December 2000, nine air monitors were placed around the perimeter of the Army Creek Landfill to measure levels of volatile organic compounds both at the landfill and downwind from it. **Air monitoring results shows only trace levels of air contaminants that do not pose an unacceptable health risk.** To further confirm this, a human health risk assessment was done. The assessment confirms that the risk level falls within EPA's target risk range for adult and child residents. One contaminant, benzene, was found at a slightly higher than acceptable risk range, however, it was upwind from the landfill near Route 13. Since benzene is a component of gasoline, the elevated levels might be caused by the heavy traffic on the highway. Furthermore, there are no residential areas near that location, so it poses no real risk.

Swimming in Army Creek is O.K.

In response to a request from a local resident, the EPA conducted a risk assessment to see if children swimming in Army Creek and Pond would be exposed to an unacceptable risk from contaminants.

Surface water and sediment samples collected in Army Creek and Pond in 1999 and 2000 were analyzed for EPA's Priority Pollutants. The results were used to evaluate the cancer risk and non-cancer health effects for a 10-year-old adolescent swimmer. It was assumed that the swimmer would be exposed to water and sediments in the Army Creek and Pond for two and a half hours a day, 120 days per year, for 10 years.

The total cancer risk for these conditions and the potential for non-cancer adverse health effects were both within EPA's acceptable risk range.

Therefore, swimming and exposure to sediments in Army Creek and Pond do not pose an unacceptable health risk to children or adults.

Contacts for More Information

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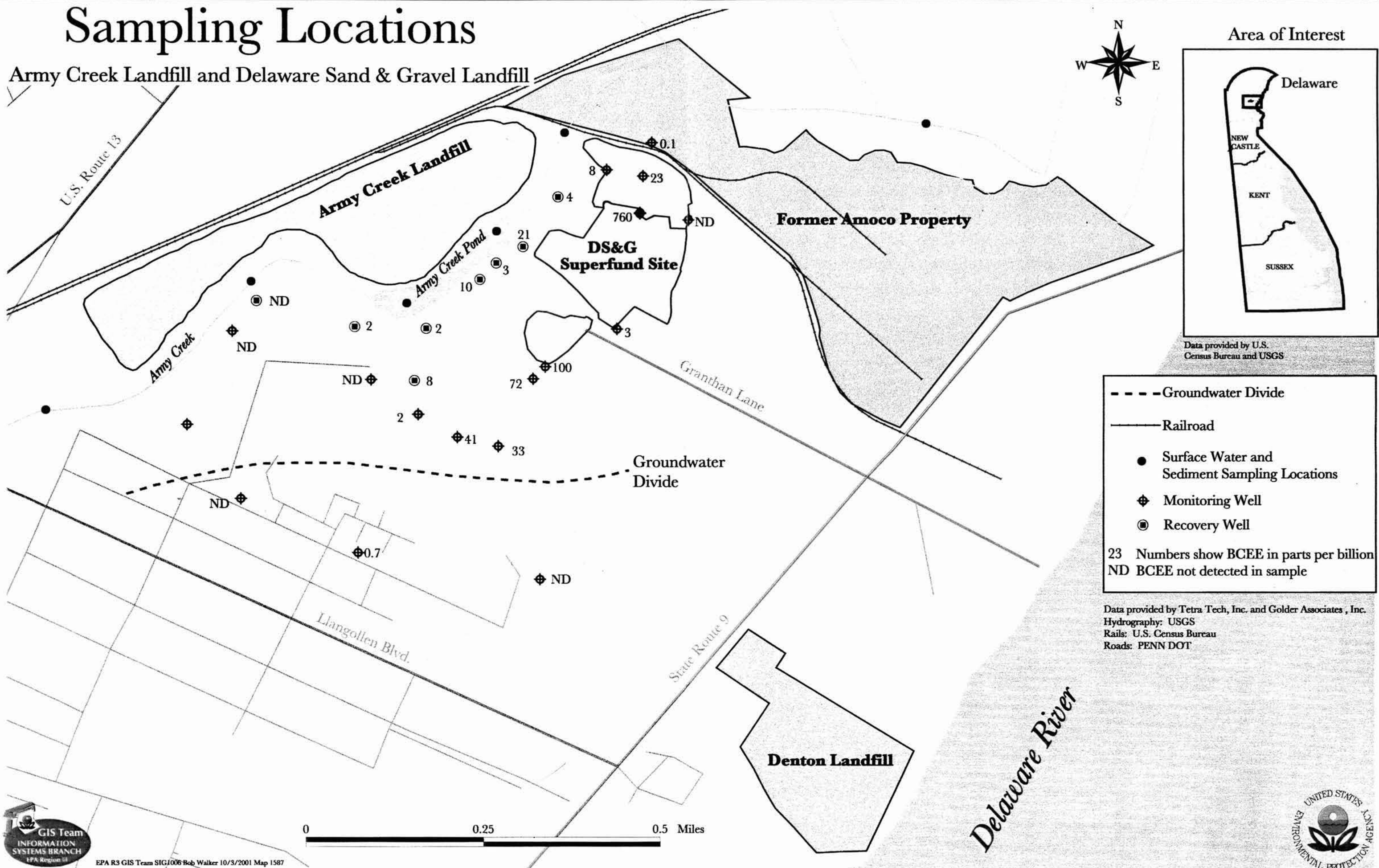
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Sampling Locations

Army Creek Landfill and Delaware Sand & Gravel Landfill



barium	NE	NE	X
chromium	NE	NE	X
iron	NE	NE	X
lead	NE	NE	X
manganese	NE	NE	X
mercury	NE	NE	X
thallium	NE	NE	X
vanadium	NE	NE	X
zinc	NE	NE	X

Key to the Table

Contaminants – this table only lists contaminants that were actually found in at least one water sample. There were many more contaminants for which we sampled, 151 in all, but those that were not detected are not listed.

Treated Water – the water that Artesian Water Company distributes to the public. It has already been treated to remove any potential contaminants.

Supply Wells – the wells that Artesian Water Company uses to draw water from the aquifer. This raw water is then treated for distribution to the public.

Monitoring Wells – wells used to draw water samples for laboratory analysis. Water from these wells is not used for public water supply.

Recovery Wells – wells on the perimeter of the Army Creek and Delaware Sand and Gravel Superfund sites used to draw groundwater away from the public water supply – creating a "groundwater divide." Water from these wells is not used for public water supply.

NE – no exceedance of the standard

X – indicates that this contaminant was found in **at least one sample from one well** at a concentration that exceeds the drinking water standard or EPA's risk-based standard. The standards are based on the assumption that if a population consumes two liters of contaminated water every day for 70 years, there would be no non-cancer health effects and only a one in a million risk of developing cancer.

Note About Laboratory Analysis:

During one round of sampling last spring, Artesian Water Company and New Castle County analyzed samples of Artesian's treated water for BCEE and got different results, using the same lab. The county reported a level of 0.6 parts per billion of BCEE in the treated water, and the water company did not report any BCEE. To settle this conflict, EPA and the Division of Public Health (DPH) took several follow-up samples in August and analyzed them at different labs. Both the EPA's and the DPH's follow-up analyses did not detect any BCEE. In addition the EPA's Quality Assurance Branch carefully reviewed the county's lab reports. EPA concluded that the county's independent lab results were due to the lab's misinterpretation of the raw data. The EPA has recently made recommendations to the county on how its lab can avoid misinterpreting data. These recommendations will be followed, and EPA will double check future lab analyses of BCEE samples.

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April 2001 Groundwater and Drinking Water Sampling Results

Contaminants (from a total of 151)	Treated Water (distributed for drinking)	Supply Wells (before treatment for drinking)	Monitoring and/or Recovery Wells (not used for drinking)
VOCs			
chloroform	NE	NE	X
benzene	NE	NE	X
bromodichloro-methane	NE	X	NE
dibromochloro-methane	NE	X	NE
1,2-dichloroethane	NE	X	X
1,1-dichloroethene	NE	NE	X
1,4-dichlorobenzene	NE	NE	X
trichloroethene	NE	X	X
tetrachloroethene	NE	NE	X
vinyl chloride	NE	NE	X
SVOCs			
BCEE	NE	X	X
bis (2-ethylhexyl) phthalate	NE	NE	X
4-methylphenol	NE	NE	X
napthalene	NE	NE	X
pentachlorophenol	NE	NE	X
Pesticides			
aldrin	NE	NE	X
dieldrin	NE	X	X
gamma-chlordane	NE	NE	X
alpha-BHC	NE	NE	X
beta-BHC	NE	NE	X
heptachlor-epoxice	NE	NE	X
Metals			
aluminum	NE	NE	X
antimony	NE	NE	X
arsenic	NE	NE	X

Know Someone Who Wants to Be Added to Our Mailing List?

Name

Company or Affiliation

Street

City/State/Zip Code

Please return this form to the below address to receive future mailings regarding the Army Creek and Delaware Sand and Gravel Superfund sites.

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INSIDE: Latest EPA findings on drinking water in Northern New Castle County



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